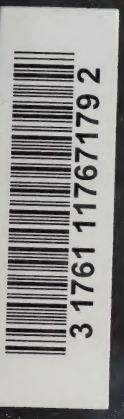

Supply and Demand
Technological Institute Graduates

1965 · 66

National Employment Service

Supply and Demand

Technological Institute Graduates

1965-66

Executive and Professional Division
National Employment Service
Ottawa

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INTRODUCTION

This first issue of the supply and demand booklet relating to graduates of technological institutes is published by the Executive and Professional Division of the National Employment Service. It is intended primarily for the use of undergraduate and graduating students of Canadian institutes of technology. The information contained herein may also be of value to prospective employers of graduates and to teachers and vocational counsellors, particularly at the high school level.

The latest available information relating to the 1964-65 class of technological institute graduates is presented, as well as significant trends in their field of employment. Some caution should be observed in using the information regarding the sizes of the graduating classes in each of the courses as the figures do not take into account losses due to drop-outs, failures, and those planning to go on to university.

Information about the different groups of graduating students and about employment opportunities is arranged alphabetically by courses. This is preceded by a section on the 1965 estimated monthly starting salaries available at the time of writing and a tabulation by courses of the graduating classes from the various institutes. The concluding section lists the institutes served by the National Employment Service and describes the role of the NES in the employment of technology students.

Technological Change

The design of a multi-level roadway, the development of a missile site, or the operation of an enterprise with an output of hundreds of products for thousands of customers, demands the services of specialists. Scientific discoveries and engineering achievements require the services of many people with varied backgrounds and with many different kinds of skill, knowledge, and experience. Traditionally, the university is the training ground for the professions and provides its graduates with a broad and deep theoretical knowledge of their chosen fields. As specialists, these graduates formulate new ideas and organize and direct technical teams. Technological institute graduates, as members of these teams, are earning recognition, and their importance is increasing.

Technological institute graduates, in contrast to university graduates, require a more specialized kind of theoretical knowledge together with practical training in complex techniques for their role as the link between the professional personnel and those performing the more routine tasks.

Growth of Technological Institutes

It is now generally believed that the freedom of scientists and other professionals, such as engineers, to expand their own specialized functions of pure and applied science is greatly dependent upon the men and women who have chosen to become technicians. For example, the British Columbia Association of Architectural and Engineering Technologists estimates three to five technicians to each professional engineer to be the optimum ratio in a fully developed area of secondary industry.

As of October, 1964, there were approximately 19,600 full-time students enrolled in post-secondary school courses at 37 institutes of technology and in several other related institutions, more than double the total of 8,200 in 1958-59. Close to 3,500 were expected to graduate in 1965.

The Technical and Vocational Training Branch of the Department of Labour estimates that the Canadian economy could readily absorb to advantage 8,500 technician course graduates per year at a ten per cent per annum increase. The training facilities presently in existence would produce an output of 4,400 graduates a year by 1967.

So rapid has been the growth of this group of occupations that, at the present time, there is little uniformity in either job duties or titles. Depending on the industry or business, the job titles may be descriptive of their technical level, e.g., engineering technician, or they may relate to the nature of the work, e.g., tool designer.

In Ontario, engineering technologists and engineering technicians can gain recognition through examination by the certification board of the Association of Professional Engineers of the Province of Ontario, in collaboration with the Ontario Association of Certified

Engineering Technicians and Technologists. The successful applicant receives a certificate stating his qualifications in one of three possible grades (Engineering Technician, Senior Engineering Technician, and Engineering Technologist). In Alberta, there is a fourth level, that of Senior Engineering Technologist. Each Ontario certificate relates to one of ten branches of engineering technology. In the majority of the other provinces, similar organizations exist or are in the process of being set up.

Studies are now being conducted to bring about uniformity in the use of titles. Presently both of the terms 'technician' and 'technologist' are freely used by industry and business. It would appear, however, that if and when the final decision is made, the number of years of formal schooling will have a bearing on the titles, and the 'technologist' will emerge as the higher qualification.

The term technological institute graduate, as used in this booklet, refers to an individual working in an occupation which requires specialized education or training in some aspect of technology or science as is given at an institute of technology. In addition this training requires a greater practical orientation than that in engineering or science at a university. The technological institute graduate requires knowledge and use of scientific and mathematical theory, ability to visualize objects, and in many instances creative ability. Many jobs require some familiarity with skilled trades although not the ability to perform as a craftsman.

New Developments

The system of year-round operation of institutions adopted by several Canadian universities is also being tried at technological institutes. In May, 1965, the Ryerson Polytechnical Institute in Toronto began operating on the trimester system. Students may enrol in a course at one of three times each year: a fall semester beginning in September, a winter semester which begins in January, and a summer semester starting in May. Ryerson's operation on this system is limited, for the time being, to courses in business administration and commerce, and in engineering technology.

Enrolments have been rising rapidly, and larger enrolments in Ontario are now being handled by offering the first year of the courses in engineering technology, business administration, and architectural technology at a number of Ontario high schools,

In September, 1965, the Southern Alberta Institute of Technology in Calgary began a new course in telecommunication technology. It consists of two years' study in basic electronic technology followed by one year of advanced instruction in such subjects as microwave and radio communication.

A number of technological institute graduates are going into teaching. Having acquired the specified employment experience, they are capable of becoming first-class teachers of vocational and commercial subjects at high schools.

There is a two-year course in practical social welfare being pioneered at Ryerson Polytechnical. It was started in September, 1964, in order to help meet the shortage of trained welfare workers in both the private and public agencies of Ontario.

A final recent development which warrants mention here is the library assistant's course being initiated at the Manitoba Institute of Technology, Winnipeg. This ten-month course, which produced 16 graduates in 1964 and 15 in 1965, is designed to provide the basic training and knowledge which will enable the graduate to adapt readily and easily into any general library work or system. The graduate is qualified to undertake such tasks as cataloguing and classification, reference work, book selection and ordering, and various other library techniques. As libraries, both public and university, become more and more specialized in their functions, and the duties of the librarian grow to seemingly limitless proportions, the need for the qualified library assistant will become more crucial.

ESTIMATED STARTING SALARIES

The following table of estimated starting salaries is based on reported starting salaries of some groups of 1965 technological institute graduates and is compiled from the sparse and limited sources available in this first year of publication. This problem has been aggravated by the fact that information on starting salaries is not universally available. Furthermore, it has been discovered that there is a wide divergence in the estimates reported. For example, in the field of electronics, the Atlantic provinces report a range of $266 to $333 per month, while the Western Ontario Institute of Technology, Windsor, estimates a spread of $376 to $435. Consequently, the table is intended only to reflect salary estimates for Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. Although the estimates have been weighted, it must also be emphasized that, as a result of the wide divergences, they will probably be high for the Atlantic provinces and low for Ontario.

Despite the limitations inherent in the available salary information, a general trend can be established. On the average, starting salaries for 1965 graduates are $15 to $20 a month higher than for 1964 graduates. This figure may be used as a rough guide line for disciplines not shown in the table.

The divergence in estimated starting salaries for 1965 graduates between the Atlantic provinces and Western Canada is seen more clearly when one examines several of the major disciplines.

In the salary table, the estimated average monthly salary for electrical technology graduates is given as $370. However, the Nova Scotia Institute of Technology, Halifax, estimates their electrical graduates can expect a monthly starting salary in the range of only $266 to $333. Ryerson reports an average figure of $403 per month, while the Southern Alberta Institute of Technology estimates an average of $315 within a range of $250 to $450 per month.

In the mechanical field, Ontario is seen at the apex, the western schools in the middle, and the Atlantic provinces at the bottom of the salary range. In this discipline, the Eastern Ontario Institute of Technology, Ottawa, reports a range of $390 to $475 per month, the Southern Alberta Institute of Technology, $323 to $410, and the Nova Scotia Institute of Technology, $266 to $333.

It is apparent from these two examples that the salary estimates for the Atlantic provinces can be as much as $90 less than the Ontario graduate can expect or about $60 to $70 per month less than the figure shown on the chart. Although this does not represent a hard and fast figure, it can be used to get some idea of the wage estimates for the Atlantic provinces in the other disciplines shown on the chart. This corrective factor can also be seen from the following two reports. Ryerson estimates the average salary paid to all its graduates as $410 per month while the College of Trades and Technology, St. John's, estimates $333 per month in Newfoundland. This wide salary divergence is probably a result of the high degree of recruiting by local employers. The advent of national recruiting by large firms is reducing the divergence, and this process is expected to continue.

ESTIMATED MONTHLY STARTING SALARIES

1965 Institute of Technology Graduates

Technology	$ Per Month
Accounting, business administration, and merchandising	390
Architectural	355
Chemical	385
Civil	380
Electrical	370
Electronic	385
Gas and Oil	394
Instrumentation	403
Mechanical	410

In other disciplines, there was insufficient information available which could be used to produce meaningful estimates for inclusion in the foregoing table. However, in many of these disciplines, estimates were available which might be of interest as a guide line to the reader, but which could not be used as a basis for the construction of national estimates. These estimates are presented in the following paragraphs.

The Northern Alberta Institute of Technology and the Southern Alberta Institute of Technology estimate that the starting monthly salary offered to drafting technology graduates was in the vicinity of $340. Drafting technology courses are basically peculiar to the western institutes.

In the field of food management, two widely diverging figures appear. The Ryerson Polytechnical Institute estimates a starting salary for 1965 graduates in food management of $375 per month. The Saskatchewan Technical Institute, Saskatoon, reports a smaller figure of $225 to $275. Thus no meaningful national average can be calculated.

The Canadian Institute of Forestry suggests that the starting salary for forestry graduates in 1965 should be in the range of $295 to $333 per month in government service and a little higher, $350, in industry.

Although no information is available concerning graduates in refrigeration and air conditioning in Quebec, the two western schools, Northern Alberta and Southern Alberta, estimate the starting salaries for 1965 graduates in the range of $275 to $410, with a mean figure of close to $330 per month.

Starting salaries for land surveyors range from $300 to $400 at the Southern Alberta Institute of Technology and from $250 to $400 at the Nova Scotia Land Survey Institute in Lawrencetown, with a mean of about $335 per month.

ESTIMATED 1966 GRADUATING CLASSES

The following table shows the number of students expected to graduate by discipline from each institution. These figures were taken from a survey conducted in October, 1964, by the Education Division of the Dominion Bureau of Statistics and edited for use in this booklet.

A blank space indicates that the institution does not offer that particular course, while a dash indicates that, although there are no graduates in that particular year, the course is offered at the institution.

The figures appearing as totals are not necessarily columnar totals. Instead they represent the number of graduates from the tabulated institutions expected in 1965 and 1966, as determined by the percentage increase or decrease of comparable figures between the two graduations of 1965 and 1966. Finally, it should be noted that attrition rates have not been applied to the figures given in this table.

Institutes	Aero. Tech.		Archit. Tech.		Auto & Diesel		Bus. Admin.		Chem. Tech.		Civil Tech.		Communications	
	65	66	65	66	65	66	65	66	65	66	65	66	65	66
(1) St. John's (COTT)			—	16			13	30			10[5]	9		
(2) Halifax (NSIT)														
(3) Moncton (NBIT)			17	23			18	30			2	8		
(4) Saint John (SJIT)							13	21			—	11		
(5) Arvida (IT)									—	—				
(6) Chicoutimi (IT)					10	8					3	5		
(7) Hull (IT)					4	2			6[12]	14	1	—		
(8) Lauzon (IT)					28	14					13	8		
(9) Montreal—Laval (LIT)	18	47							17[12]	91	21	20		
(10) Montreal (IT)					49	20					7	19		
(11) Quebec (IT)					—	—					5	7		
(12) Rimouski (IT)					22	18					6	4		
(13) Shawinigan (IT)					13	3			17[12]	30	1	—		
(14) Sherbrooke (IT)					10	7					9	6		
(15) Three Rivers (IT)					46	21					7	10		
(16) Haileybury (PIM)														
(17) Hamilton (HIT)									9	16				
(18) Kirkland Lake (NOIT)							—	—	—	—	—	9		
(19) Lakehead (CAST)			—	—			—	—						
(20) Ottawa (EOIT)			—	—			38	61	17	27	—	—		
(21) Toronto (Ryerson)	7	5	46	81			142	324	59	103	44	90	64	113
(22) Windsor (WOIT)							—	—	44	69				
(23) Winnipeg (MIT)							27	73			28	41		
(24) Moose Jaw (STI)			19	30			26	62			30	34		
(25) Saskatoon (STI)														
(26) Calgary (SAIT)	12[4]	18	14	18	20	35	31	36	38	66	21[5]	19		
(27) Edmonton (NAIT)			27	30			31	74	30	60	23	28	21	27
(28) Burnaby (BCIT)			—	27			—	62			—[5]	31	—	30
Estimated Totals	35	70	125	225	200	130	340	775	240	475	230	360	85	170

Footnotes:

[1]Called Industrial management.

[1a]In addition 8 17 in Industrial Production.

[2]For a total of 20 33 in Welding from Quebec; remainder in other trades: Foundry, Heavy duty equipment, Pattern making, Plumbing & heating, Power plant engineering, Sheet metal.

[3]In addition — 31, in Forest products utilization.

[4]In addition 18 26, in 2-year course—Aircraft maintenance.

[5]In addition 8 26 at St. John's, — 30 at Burnaby, and 17 29 at Calgary in Land survey.

[6]Called 'Control systems technology'.

[7]Called 'Power technology'.

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Institutes	Draft. Tech.		Elect. Tech.		Electronics		Food Tech.		Forest Tech.		Gas & Oil		Control Tech.	
	65	66	65	66	65	66	65	66	65	66	65	66	65	66
(1) St. John's			8	18	14	19								
(2) Halifax			8	10	8	17								
(3) Moncton			12	12	18	42								
(4) Saint John					4	6							—	7
(5) Arvida	—	—	30	16										
(6) Chicoutimi			24	11	14	22								
(7) Hull			8	7	14	12								
(8) Lauzon			21	24									23	16
(9) Montreal—Laval			36	30	45	59								
(10) Montreal			60	23	71	101								
(11) Quebec			22	28	49	53								
(12) Rimouski			28	36	17	20								
(13) Shawinigan			12	4	19	26								
(14) Sherbrooke			11	11	21	40								
(15) Three Rivers			61	29	41	76								
(16) Haileybury														
(17) Hamilton			14[6]	47	26	—								
(18) Kirkland Lake					14	30								
(19) Lakehead									24	37				
(20) Ottawa					60	66								
(21) Toronto			20	33	92	137	13	44			4	6	8	4
(22) Windsor					30	49								
(23) Winnipeg			13	22	37	67								
(24) Moose Jaw	—	18	26[7]	16	18	31								
(25) Saskatoon	4	—					6	21						
(26) Calgary	15	22	19	23	56	102					24	44		
(27) Edmonton	28	30	14	24	78	99	—	15	—	28	15	18	15	24
(28) Burnaby					—	60	—	21	—[3]	33	—	13	—	30
Estimated Totals	45	70	445	425	745	1175	20	100	25	100	45	80	45	80

Footnotes:

[8]Called 'Chemical and metallurgical technology'; in addition — 12 in Mining technology.

[9]In addition 5 20 in Dental programs.

[10]Called 'Materials technology'; in addition — 22 in Exploration technology.

[11]In addition 11 4 in 'Production option'.

[12]Called 'Industrial chemistry' at the Quebec institutes.

[13]Called 'Engineering technology'—2-year course.

Institutes	Tool Making		Mech. Tech.		Med. Lab.		Med. X-Ray		Metal and Mining		Refrig. Tech.		Secretarial		Welding[2]	
	65	66	65	66	65	66	65	66	65	66	65	66	65	66	65	66
(1) St. John's			—	11	—	9										
(2) Halifax			2	11												
(3) Moncton			9	17												
(4) Saint John																
(5) Arvida	8	11														
(6) Chicoutimi	22	13													3	3
(7) Hull	—	5													1	1
(8) Lauzon	16	11													2	7
(9) Montreal	26	25									7	13			3	15
(10) Montreal	68	24													14	6
(11) Quebec	20	15									4	10			1	3
(12) Rimouski	7	19													7	7
(13) Shawinigan	12	15													4	5
(14) Sherbrooke	14	9													—	6
(15) Three Rivers	47	27							11	32	2	6			17	4
(16) Haileybury									23	42						
(17) Hamilton			30	28									191	44		
(18) Kirkland Lake			11	24												
(19) Lakehead															15[13]	29
(20) Ottawa			17	40												
(21) Toronto			52[11]	100	19	—			13	22			55	97		
(22) Windsor			27	43												
(23) Winnipeg			18	34	24	89	24	30					4	34		
(24) Moose Jaw			18	29									9	19		
(25) Saskatoon													22	27		
(26) Calgary			8	16							10	16			9	18
(27) Edmonton					50	53	24	9[24]	15[10]	24	12	20	—	[1a] 6	12	20
(28) Burnaby			—	42					—[8]	29			—	30		
Estimated Totals	240	175	190	395	95	190	50	55	60	145	35	65	110	255	90	125

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AERONAUTICAL TECHNOLOGY

ONLY two Canadian institutes of technology offer courses in aeronautical technology—Ryerson Polytechnical Institute in Toronto and the Southern Alberta Institute of Technology in Calgary. In addition, an aeronautics course is given at the International Airport at Dorval under the direction of the Laval Institute of Technology in Montreal.

The Ryerson course is of three years' duration and consists of a mechanical and aeronautical option stressing mechanics along with aeronautical design and dynamics. Southern Alberta offers a three-year course in aeronautical engineering for technicians, and a two-year course in aircraft maintenance technology. This second course covers instruction in both airframes and engines and provides the technical training required by the Department of Transport for the Aircraft Maintenance Engineer's Certificate "A" category. Graduates of this course find employment with aircraft-operating companies all over Canada, and Southern Alberta reports that industrial development in the north has improved the employment situation both for mechanics' helpers and for licensed aircraft maintenance engineers.

Approximately 100 graduates in aeronautical technology and aircraft maintenance from both institutes are expected in 1966, twice the number graduated in 1965.

The Canadian Aeronautics and Space Institute reports a greater demand for technicians than for technologists. In general, however, the supply and demand is in balance, and employers foresee no serious difficulties in meeting their requirements. The Institute suggests starting salaries for technological institute graduates will average about $400 a month, while technicians can expect in the vicinity of $325.

AGRICULTURAL TECHNOLOGY

THE Agricultural Institute of Canada reports that technicians with adequate training are required in all agricultural pursuits including research, extension, regulation, and services. The technician requirement is to support and facilitate the effectiveness of professionals in these four broad areas.

The Institute suggests that the demand for trained technicians in these various fields has not been fully and completely evaluated, and that the lack of these technicians has in the past resulted in the use of theoretically-trained persons being employed to carry out technical functions. It has also obliged professional people to select untrained assistants and provide them with the required training. The extent to which these two procedures have been exercised clearly indicates that there will be a very substantial demand for agricultural technicians on their becoming available.

In research, the demand for trained technicians is found largely in faculties of agriculture at Canadian universities, in research programs sponsored by the national and provincial departments of agriculture, and, to a limited extent, in private organizations that are carrying out research on agricultural chemicals and food products primarily. Work in this field requires a knowledge of laboratory techniques and instrumentation to be applied in the chemical analysis of soils, nutrition, the physiology of plants and animals, and food processing. Studies in botany, bacteriology, and histology, involving biological techniques and instrumentation as well as the handling of experimental plants and animals, are among the research tasks required of an agricultural technician.

Since government departments are largely responsible for carrying out the regulatory function in agriculture, the opportunities for technicians in this area are limited to employment with such departments. In this type of employment, a technician would likely be involved in either inspection services or in the testing of agricultural chemicals and pesticides.

The field of agricultural extension is a very broad one. Provincial departments of agriculture throughout Canada have extension personnel who require the support of technicians trained in education and regulation. Commercial organizations are employing more and more agricultural technicians in their sales organizations. These technicians are required to be proficient in the techniques of agricultural education so that they may support professional people engaged in this field of endeavour.

Service work in the agricultural and food industries involves quality control in the canning, bottling, or packaging of fruits, vegetables, cereals, meats, and all other food products originating from agricultural production. The Agricultural Institute reports it is the rapidly expanding food industry that is

providing, at present, the greatest and most exciting demand for agricultural technicians. Again, because this industry has in the main been required to engage in on-the-job training of technicians, a clear assessment of the demand of the industry is not available. There is, however, little doubt that the requirement is substantial.

An estimated combined increase in graduations of 10 per cent for 1966 is anticipated at the two Quebec Institutes of Agricultural Technology at Saint Hyacinthe and La Pocatière. This represents a total of about 60 students for that year.

The Agricultural Institute reports starting salaries with the federal government at about $4,620 per annum.

ARCHITECTURAL TECHNOLOGY

THE ratio of demand to supply for graduates in architectural technology has always been at least two to one and on occasion has risen as high as five to one. With Canada's present prosperous business conditions this demand should continue at a high level, and the expected 225 graduates in 1966, almost twice as many as in 1965, should face limitless employment opportunities. Ryerson is expected to produce one-third of all 1966 graduates. The Newfoundland College of Trades and Technology anticipates a first graduating class of 16 students in 1966. This will bring to seven the number of technology schools offering a diploma in architectural technology.

Generally the architectural program is based on three main aspects: architectural design; the properties and functions of construction materials, and elementary problems of structural design. However, some schools tend to emphasize one or two of these aspects in an attempt to attain some degree of specialization. Thus at the Northern Alberta Institute of Technology and at the New Brunswick Institute of Technology in Moncton, there is a strong emphasis placed on practical drawings and details. At the British Columbia Institute of Technology, where the course is known as building technology, the study of the properties and functions of construction materials seems to be the area most heavily stressed.

The majority of graduates in this field are employed by architectural firms or in the architectural departments of the federal, provincial, and municipal governments. Other graduates are employed by banks and real estate, commercial, industrial, contracting, and surveying concerns. Some graduates take up employment with furniture and equipment companies in the research, design, manufacture, sales, and retailing of building products.

A graduate in architectural technology, one who is trained to assist the architect in all phases of architectural work both in the field and in the office, has a wide variety of duties. He prepares drawings or scale models according to the architect's plan and makes up working drawings and details after the design has been accepted. The graduate must have a thorough knowledge of all building materials when he prepares working drafts. Often the architectural technology graduate will draw up the set of specifications before tenders on contracts are received. Finally, at the building stage the graduate assumes the identity of an inspector or supervisor.

Other functions the graduate may be called upon to perform might be estimating, plan checking, or retailing. With experience and self-development, graduates may find employment with professional firms, contractors, government, and industry as design assistants, job captains, specification writers, or fire underwriters.

The estimated starting salary for graduates in architectural technology ranges from $300 to $405, depending upon the courses studied and the particular vocation chosen.

BUSINESS ADMINISTRATION

THERE will be approximately twice as many graduates in business administration in 1966 as in 1965. Almost half of the total graduating in 1966, about 130, will come from Ryerson. Both the Newfoundland College of Trades and Technology at St. John's and the British Columbia Institute of Technology at Burnaby are expecting their first graduates in the spring of 1966. The Western Ontario Institute of Technology, Windsor, and the Northern Ontario Institute of Technology, Kirkland Lake, are expecting their first graduating classes in business administration in 1967.

The increasing complexity of the business world and the resultant high demand for business administration graduates give the graduate in business administration numerous and diverse employment opportunities. Ryerson reports that the number of job offers is so great that many are just accumulating with

little prospect of their being filled. Indeed demand so far outstrips supply that enquiries are now being made by interested employers at schools such as the Western Ontario Institute of Technology where the first graduation class is not expected until 1967. Further, several institutes, including the Eastern Ontario Institute of Technology and Ryerson, report that as employers become increasingly aware of the value of the business administration graduate, the potential employment opportunities should be limitless.

The starting salary of the graduate in business administration should range between $315 and $410 per month. The actual salary paid will depend on the options the graduate has studied and the type of graduate the employers require. Thus graduates in accounting and merchandising, for whom there seems to be a stronger demand, might expect a higher salary than those who have concentrated on other options.

The courses of study open to the business administration student are as varied as they are numerous. Ryerson offers such options as hotel, resort, and restaurant administration, industrial management, and financial management, as well as accounting, marketing, and merchandising. One uncommon option being offered is distributive technology at the Northern Alberta Institute of Technology.

The vast majority of graduates enter the business world whether with industry, national retailing concerns, or with banking and finance enterprises. Some graduates enter government service in an administrative capacity, while a smaller number of accounting graduates are employed in the high schools as teachers of commercial subjects.

The business administration course, embracing the technical nature of administration and marketing processes, prepares the graduate for a wide variety of employment opportunities within the business world. Although the new graduate is not usually hired for a particular defined job, he should be able to find his chosen vocation in any of the following endeavours: marketing, planning and scheduling production, price estimating, cost analysis, credit management, insurance, banking, auditing, accounting, or in operations research.

The Guidance Centre of the Ontario College of Education states that there is probably no field in Canada which offers so much to the young man today as managership, be it in advertising, purchasing, or accounting. The business administration graduate has been trained to step into such positions, but his success in this field depends as much on his initiative, creativity, and administrative ability as on his educational training.

CHEMICAL TECHNOLOGY

THERE is likely to be 66 per cent more graduates available in 1966 than in 1965. The largest increase in graduating classes will occur at the institutes located in Quebec and Alberta. The new institute at Burnaby, B.C., will produce its first chemical and metallurgy technology graduates in 1966, and Kirkland Lake's Northern Ontario Institute of Technology will follow in 1967 with its first chemistry technology graduates. At Saint John, N.B., a chemical course was instituted in September, 1965.

The demand for graduates is good and should continue for some time. The Chemical Institute of Canada reports that the ratio of technicians to scientists is about five to one in some European countries. In Canada the situation is almost the reverse so that there should be good possibility for growth in the field. In addition, the continuing small supply of chemists is likely to cause an increase in the need for chemical technicians.

In general, when a chemical technology graduate is employed in research and development, he assists a chemist in the laboratory work. This may be in analysis, synthesis, development of methods, or in one of a number of varied fields. He must have some knowledge of chemical theory and some facility with calculations and mathematics. Here developing new compounds and new methods of preparing compounds economically are the objectives. He may be called a laboratory assistant or technician, a research and development technologist, or a chemical technologist. He may work in industry, research institutions, or for governmental organizations.

Graduates of chemical courses are employed by industry in quality control and in standard analysis. In such a setting, the graduate is checking and ensuring quality standards at various stages of production. While in standard analysis, whatever the setting, he is finding "what" and "how much" is in a product. Also, he may be devising measuring and other instruments, preparing batch formulas, conducting pilot plant operations, and supervising routine work. Here he may be called a process technologist, a control analyst, or a pilot plant operator. Alternatively, he may be employed

as a technical sales representative or be given supervisory and management responsibilities.

Chemical technology graduates are needed to fill positions similar to those mentioned above in such industries as chemical, petroleum, pulp and paper, plastics, pharmaceuticals, fertilizers, mines, steel mills, canneries, steel and pipe mills, and meat-packing plants. They are required in government research projects conducted by national and provincial organizations. An increasing number of opportunities exist in the federal government in the departments of Agriculture, Health and Welfare, Mines and Technical Surveys, Forestry, and the inspection services of the Department of National Defence. The future for chemical technology graduates is bright since, as the Association of Professional Engineers of the Province of Ontario has observed, their potential in food technology has not yet been fully recognized by industry.

The starting salary of a graduate in chemical technology is about $300 to $400 per month depending upon the position and the employer's policy and location. Students are eligible for student membership in the Chemical Institute of Canada. The C.I.C. operates a plan for the utilization of chemical technicians, and graduates in chemical technology may write examinations to qualify for professional membership.

CIVIL AND SURVEYING TECHNOLOGY

THE Manitoba Institute of Technology reports a fairly strong demand for civil technology graduates, particularly for those with structural or highway options, and it would appear that the future demand in this field will be high. The Saskatchewan Technical Institute at Moose Jaw reports that there is a particularly strong demand for civil technology graduates. The British Columbia Institute of Technology at Burnaby states that good opportunities should exist in government service, consulting engineering firms, architects' offices, and contracting firms. On the other hand, the Association of Professional Engineers of the Province of Ontario is of the opinion that this group seems to have the most difficulty in securing employment on graduation, although most graduates eventually find jobs.

Civil technology is concerned mainly with the design and construction of bridges, highways, railways, airports, dams, power developments, canals, docks, harbours, and buildings of all kinds, as well as drainage, irrigation, sewage, and water supply systems.

A student graduating in this discipline may be employed as an inspector or supervisor in the contracting field, as a laboratory technician, or as a design or field technician in a consultant's office. Municipal, provincial, or federal agencies, consulting engineers, architects, and contractors, as well as technical sales organizations, are some of the main employers.

The total number of graduates in civil technology in 1965 was approximately 200. It is anticipated that there will be a 25 per cent increase in graduates in 1966.

At the institutes of technology at Moncton and Saint John in New Brunswick, there are five options offered in civil technology. These consist of the architectural, building construction, highway and municipal, materials and testing, and structural steel options.

At the Manitoba Institute of Technology, a student may choose either the highway or the structural option.

The mean starting salary for a graduate in civil technology should average at $380 monthly. There will be variations in this figure in accordance with the options chosen by the graduate.

A discipline closely related to civil technology is surveying. This course is offered at the British Columbia Institute of Technology, the Southern Alberta Institute of Technology, Newfoundland's College of Trades and Technology, and at the Nova Scotia Land Survey Institute.

This course equips the student with the required knowledge of mathematics, physics, astronomy, photogrammetry, and theory of surveying. Along with this the student gains practical skills in note-keeping and field operations which include calculations. All typical engineering survey problems are worked out under field conditions and computed and recorded in the drafting room.

The Nova Scotia Department of Education, Vocational Education Division, reports that job opportunities are excellent and that the demand greatly exceeds the supply. This view is also shared by the institutes of Southern Alberta and British Columbia.

There is a variety of employment opportunities for the surveyor. Graduates are offered employment with surveying firms, the oil exploration industry, gas and oil pipe lines,


Gordie Tapp
MR GORDIE TAPP
EXPIRES
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TORONTO

consulting engineers, and government highways and civil engineering departments. In Canada, the areas of employment range from the southern border to the Arctic regions and from the Pacific to the Atlantic ocean.

There was a total of 37 students graduating in surveying in 1965. This 1965 figure is expected to be tripled in 1966.

Starting salaries for land survey technology graduates range from $265 to $400 monthly, with the mean being at about $316.

COMMUNICATIONS

THE increasing expansion and importance of all communications media is multiplying the need for trained personnel. This growing need and an increasing awareness by employers of the usefulness of communications graduates from technological institutes will further improve employment opportunities which already are very good. At the moment there are three schools offering various options in communications technology. As well, Ryerson gives diplomas in journalism, photographic arts, radio and television arts, and printing management. The Northern Alberta Institute of Technology offers production and technical options in the field of broadcast communications.

Newspapers, magazines, and the newsrooms of radio and television are constantly seeking competent, well-trained beginners, and the employment field for journalism graduates is ever expanding. Of the 45 graduates expected in the three-year course at Ryerson in 1966, a 60 per cent increase over the number of graduates in 1965, few should experience difficulty in finding suitable employment. Most graduates take employment with newspapers, magazines, and radio and television at an average starting salary of $380 per month. These graduates usually begin as reporters but the academic education and practical experience gained at Ryerson allow them to rise rapidly to positions of responsibility.

Radio and television arts is another course peculiar to Ryerson. The first year of this course is taught in conjunction with the first year of the journalism course, stressing all fields of communication both written and spoken. In the graduating year emphasis is placed on the television option. Upon graduation, the student is qualified to take up such positions as announcer, writer, studio producer, or program planner. Depending upon his imagination, initiative, and application, the graduate should earn in the vicinity of $375 per month. That the broadcasting industry, both local and national, is encouraging this course is a good indication of the high demand for these graduates and should ensure the 45 graduates in 1966 many employment opportunities.

A course closely allied to the one offered at Ryerson is broadcast communications, given at the British Columbia Institute of Technology. This course, begun in 1964, is divided in two quite distinct two-year options. The production option, which is expected to produce 18 graduates in 1966, is very similar to Ryerson's pioneer course. Graduates usually are employed as writers, news editors, operators, or announcers. The twelve expected graduates in 1966 from the technical option, a course strongly oriented to the electronic end of radio and television, will find employment in such positions as transmitter or studio maintenance technician. With new radio and television stations coming on the air every year, the demand for these trained technicians should continue to rise.

There is expected to be an increase in the number of photographic arts graduates in 1966 to fill an increasing demand. Ryerson expects a graduating class of 25, while the Northern Alberta Institute of Technology anticipates a graduating class of 27. This total graduating class of 52 is 50 per cent larger than the 1965 class of 35. Many career opportunities are available for the student of photography, and graduates may obtain employment in the dark rooms of studios, large firms, industrial plants, newspapers, or magazines. Employment may also be found with any of the above in the field of pictorial photography. A few seek employment in the motion picture industry. Photography is a growing field, especially in industry, and with a desire to work and learn, the graduate may expect a salary favourably comparable to other fields of technology.

Printing management is offered only at Ryerson. This study in the graphic arts includes training in lithography, letterpress, paper, inks, and machinery, as well as courses relating to business management, estimating, accounting, statistics, and money and banking. With such training, the 16 graduates expected in 1966 will be qualified to start as estimators, salesmen, purchasers, and quality controllers, and will likely work as assistants to the production manager or superintendent. Starting salaries should be in the general range of $375 per month. Employers are supporting the institute offering this course, and graduates in this area of communications are in considerable demand.

DENTAL TECHNOLOGY

DENTAL technology is peculiar to institutes in Western Canada. The Northern Alberta Institute of Technology is the only institute offering diplomas in three areas of study: dental assisting, dental mechanics, and dental technician programs. The Vancouver Vocational Institute offers a course in dental assisting and is the only other institute in Canada with dental technology in its curriculum.

The dental assisting program consists of a ten-month course which combines lectures in such subjects as physiology, nutrition, anatomy, and bacteriology with laboratory work and practical external training. The graduate is trained to handle and sterilize equipment, prepare materials, develop X-rays, and carry out the administrative work of a dentist's office. Most graduates are employed in private offices. However, some do find employment in dental clinics, hospitals, and public health services. Remuneration is in the vicinity of $225 per month.

The two-year dental mechanics program, as outlined in Northern Alberta's calendar, is intended to give a sound theoretical, practical, and scientific background to the student in dental mechanics. He is trained to construct complete dentures. Though there were no graduates in 1965, six are expected in 1966. The graduate in dental mechanics usually will begin work with a large firm which runs a laboratory. After experience has been gained, many graduates set up laboratories of their own. Depending upon the employer and the location of employment, salaries should range between $250 and $350 per month.

Upon completion of the two-year dental technician course at Northern Alberta, the dental laboratory technician is qualified to make artificial dentures—teeth, crowns bridges, or other dental and orthodontal appliances and may work with ceramics or gold and other metal alloys used in dentistry. Dental technicians do not deal directly with patients, but receive prescriptions from dentists. Employment patterns are very similar to those of dental mechanics, but most opportunities are in salaried employment. A technician whose work has become known to several dentists in the community will have the best prospect of building a successful business of his own.

Dental technology graduates perform a much-needed function, and a moderate increase in employment opportunities is anticipated over the long run. The increasing awareness of preventive dentistry, the growing number of people in older age groups, and the large number of people requiring artificial dentures indicates the need for more graduates in all programs of study. Instructors at the Northern Alberta Institute of Technology feel that the potential employment opportunities for these graduates are very good.

DRAFTING TECHNOLOGY

DRAFTING technology, as a distinctive discipline in itself, has always been peculiar to the institutes of Alberta and Saskatchewan. However, in 1966 the five Ontario vocational centres, now offering two-year post-secondary school programs in technology, expect a graduating class of 17 students. In 1967 the Institute at Arvida expects about 20 graduates.

The Northern Alberta Institute of Technology reports a brisk demand for its drafting graduates, with some receiving as many as four job offers. The Southern Alberta Institute of Technology confirms this trend and states that graduates in drafting technology are among the most sought after of all students graduating. As a result of this strong demand, enrolments have jumped and in 1966 the graduating class should total about 70 students, an increase of about 33 per cent over the 1965 class. Salaries have also jumped from an approximate average of $315 a month to $340. Generally graduates in drafting technology can expect a starting salary in the range of $300 to $370 per month. However, since there seems to be a stronger demand for electronic and mechanical draftsmen, salaries in these fields should be somewhat higher.

The employment opportunities for the graduate in drafting technology are extremely varied. Upon graduation, the student may specialize in mechanical, tool design, electrical, electronic, topographical, aeronautical, or marine drafting, to name but a few. At the present time the courses offered in the institutes are quite varied, and the aim of the schools seems to be to give a general education in most of these fields rather than concentrate on any special one. Thus after acquiring a degree of competency in drafting, and a basic understanding in mathematics and physics, draftsmen must be trained on the job to bridge the gap between their education and the special drafting requirements of each particular employer.

Graduates in drafting technology usually find work as assistants to scientists, engineers, contractors, and architects in almost all fields of industry. However, some graduates, especially those interested in cartography, will enter governmental service.

Graduates start as junior draftsmen and undertake a training program. This training program may take from three to four years before the graduate is classified as a competent draftsman in the specialty he has chosen.

ELECTRICAL TECHNOLOGY

ELECTRICAL technology graduates should be readily absorbed into the labour force as all reports indicate that graduates from this course are in demand. The Nova Scotia Department of Education, Vocational Education Division, states that the supply of graduates does not come close to meeting the demand, and many of the electrical companies elsewhere in Canada are not able to fill their manpower requirements in this field. Prospects for the future are also good. Greater emphasis on the better use of manpower, plus automation in business and industry and the industrialization of Canada, should insure a steady demand for these graduates.

The electrical technology graduate will have a solid foundation in basic science and mathematics giving him the flexibility required to adapt to changing situations. Graduates will find employment in many areas of the electrical industry including companies manufacturing electrical equipment in such departments as production control, market planning, development, testing and inspection, estimating, installation, and operation. Others may find employment as sales or service personnel in the distribution of electrical equipment. A number of graduates enter the communications field in the supervision, planning, and operation of telephone systems and in sound or television broadcasting.

The 1966 graduating class will be of approximately the same size as that of 1965.

Starting salaries range from $315 to $410 per month with an average of $370. However, as in most other courses, salaries will vary depending upon local economic conditions and the type of work involved.

ELECTRONIC TECHNOLOGY

THE rapid expansion of the electronics industry has forced the engineer to devote virtually all his time to theoretical problems and development studies. This has created a greater need for a type of electronic specialist who can adapt the engineering development to practical application.

This accounts for the current strong demand for electronic technology graduates, and graduates in this field from the various technological institutes should have no difficulty in finding suitable employment. Virtually all the technological institutes report that their graduates in this course are in demand. For example, the British Columbia Institute of Technology reports that the electronics field is expanding rapidly and that the demand for well-trained graduates will be a continuing and increasing one. The Nova Scotia Department of Education, Vocational Division, states that job opportunities are excellent and that the demand greatly exceeds the supply.

Graduates will find excellent employment opportunities in an increasing number of fields. Because the field is so broad, graduates generally become specialists in one area, such as communications, and often in a subdivision such as radio or television. There are also employment opportunities with companies manufacturing specialized equipment for such uses as industrial and medical measuring; recording, indicating, and controlling devices; navigation; missile and space craft guidance and control; electronic computers, and many other types of equipment using vacuum tubes and semiconductor circuits.

Others may find challenging career opportunities in engineering or research laboratories and government research agencies such as the Defence Research Board and the National Research Council.

The majority of electronics technology graduates are located in the larger cities in Canada, such as Montreal and Toronto, as the engineering laboratories of the electronics industry are situated there.

There is expected to be approximately 1100 graduates in electronic technology in 1966 from the various technological institutes. This represents an increase of approximately 50 per cent over the 1965 figure. Particularly large increases in graduation classes are expected at the New Brunswick Institute of Technology in Moncton where the 1966 graduating class

should be approximately twice the size of that of 1965 and at the Southern Alberta Institute of Technology where the 1965 class of approximately 50 is expected to double in 1966. In addition, the British Columbia Institute of Technology will be turning out its first graduating class in 1966, numbering about 60.

Starting salaries for the new graduate range from $300 to $435 per month.

FOOD MANAGEMENT AND PROCESSING

In research institutions, in hospitals, and in commercial institutions all across Canada, there is an increasing need for trained personnel capable of assuming responsible positions in food service operations. Although the demand for graduates in food management and processing is not as urgent as in some technologies, a healthy demand is seen by the Northern Alberta Institute of Technology and the British Columbia Institute of Technology which have just begun offering this course in their curricula and are expecting their first graduates in 1966. Coupled with Ryerson and the Saskatchewan Technical Institute in Saskatoon, the addition of these new graduates from the institutes of Northern Alberta and British Columbia should increase the total number of graduates in food technology fivefold over 1965. Of the expected total of 100 graduates in 1966, almost half should come from Ryerson.

Although the various institutes denote their courses by different names, the programs of study for all, except Ryerson, are virtually the same. Ryerson's food administration course is taken as a third-year specialized option at the conclusion of a general two-year home economics courses, whereas the courses in dietary service technology, food service technology, and food processing at Northern Alberta, Saskatchewan, and British Columbia respectively, are all two-year courses of study.

The graduate in food technology will find a wide range of employers who require his or her services. These include hospitals, government service, restaurant or hotel chains, food producers, and large commercial and industrial concerns.

Generally the graduate serves as a skilled technician, to oversee and control the complex operations involved in modern food production. More particularly the graduate may find his or her vocation in the cooling, heating, fermenting, canning, or drying processes of the fish, meat, dairy, fruit, or vegetable industry. Some will find employment in governmental and private inspection services, while others will enter the research field, both governmental and private, as technicians to assist in various chemical or bacteriological tests or in the development of new processes. Finally many graduates in food technology will serve as assistants to graduate dietitians in dietary departments, hospitals, or commercial concerns. Smaller institutions, unable to obtain the services of a registered dietitian, often employ a graduate in food technology to perform the functions of a dietitian.

Salary estimates for these graduates are limited. Ryerson reports an average monthly salary of $380 a month, while the Saskatchewan Technical Institute estimates a range of $225 to $275 per month. With the increased support of such organizations as the Department of Health and Welfare, the registered dietitians associations, and various restaurant, hotel, and hospital associations, the usefulness of the food technology graduate should become more widely appreciated. The result should be higher salaries and better employment opportunities, especially in Western Canada.

FORESTRY AND FOREST PRODUCTS TECHNOLOGY

The Canadian Institute of Forestry reports the present ratio of technicians to foresters is one to one. The desired ratio is three to one, meaning that an annual increase of 1,000 technicians can easily be absorbed.

The British Columbia Institute of Technology reports that as a result of the expanding forestry industry in British Columbia, the demand is quite strong for forest technicians. This same outlook regarding employment opportunities is shared by the Technological Division of Lakehead University.

The forest technician is involved in the utilization of forest areas for natural recreation. Some areas are perhaps set aside for camping and picnicking, while other areas are kept for hunting or active logging. Protection of the resources from fire, insect infestation, or disease attack also plays a major role in the forester's activities. Protection planning practices for our forests require the knowledge of road building, bridge building, and the erection of lookouts and cabins so that facilities are available in time of need.

The Canadian Institute of Forestry reports that forest technicians employed by our pro-

vincial forest services have open to them a number of specialized positions including conservation officers in fish and wildlife field programs; as forest technicians with entomological and pathological surveys; as rangers in forest fire prevention and suppression activities; as field supervisors with reforestation programs, and as technicians undertaking forest survey and research studies.

The logging and pulp industries hire forest technicians for work on forest surveys and studies and as timber-cutting supervisors, fire prevention officers, and timber scalers.

There were 24 graduates in forest technology in 1965 at Lakehead, and an increase of about 50 per cent is expected in the number of graduates in 1966. British Columbia and Northern Alberta will be graduating their first students in forestry and in forest products and utilization in 1966. Consequently, there will be about 90 such graduates, with about 60 graduating from the British Columbia Institute of Technology.

Starting salaries vary between $295 to $333 per month in government service, but Lakehead reports salaries as high as $375 to $450 monthly.

At the British Columbia Institute of Technology a student has a choice of two options in the forest products technology. The wood option includes the study of the techniques and economics involved in harvesting wood and converting it to usable products such as lumber, laminated beams, and plywood. The pulp and paper option is mainly concerned with the theory and practice of mechanical, semi-chemical, and chemical pulping and the conversion of pulp into products such as newsprint, paper, paper products, and textiles.

At Lakehead and Northern Alberta the forest technology course places emphasis on forest mensuration, forest utilization, and timber scaling.

GAS AND OIL TECHNOLOGY

A wide variety of interesting employment opportunities are available to the technological institute graduate in the gas and oil industry.

The Canadian Petroleum Association suggests that the natural gas industry will be able to absorb approximately 15 gas technicians every year for the next ten years. The Northern Alberta Institute of Technology reports that there is currently a brisk demand for graduates in gas technology with a number of students receiving several offers of employment. Similar observations of a strong demand in the petroleum industry were also noted by the Southern Alberta Institute of Technology, the British Columbia Institute of Technology, and Ryerson Polytechnical Institute.

There were about 40 students graduating in gas and oil technology in 1965. A 50 per cent rise in graduations in this field is anticipated for 1966.

The transmission branch of the industry, which includes pumping stations and the maintenance of pipe-lines, offers graduates many opportunities for outdoor work. The refining branch of the industry, on the other hand, is usually located in more populated areas and offers a variety of interesting work.

Other operations which a graduate in gas and oil technology might expect to be involved in are the testing of gas wells, sales and servicing of gas fields and plant equipment, or assisting gas engineers in their various projects.

Ryerson stresses that a student has to have an inquiring mind coupled with better than average secondary school marks in mathematics, physics, and chemistry in order to be admitted. Other institutes offering gas and oil or petroleum technology require their candidates to have a high school diploma with physics included and a B standing in mathematics. High school chemistry is also a desirable prerequisite, but it is not essential for admission.

The mean starting salary for gas and oil technology graduates is estimated at $394 per month with a wide range from $350 to $445.

At the British Columbia Institute of Technology a student can choose a gas technology option which will provide training in the distribution and utilization of gas in both industrial and domestic fields. On the other hand, the oil technology option will provide training in the transmission of oil and its utilization in modern automatically-controlled refineries. In the oil option there will be more emphasis on the chemistry of petroleum products. Both options include a brief orientation course in business practices and frequent opportunities for field trips to local installations.

The Southern Alberta Institute of Technology stresses the geological aspects of petroleum technology in its course in an effort to provide engineering and geological technicians for the petroleum industry. A good grounding in geology will enable graduates to make

excellent wellsite geologists or to work on maps or core analysis in the geology branch of oil companies.

The gas technology course at the Northern Alberta Institute of Technology places an emphasis on chemistry and the analysis of the products involved.

At Ryerson Polytechnical Institute the gas technology option could be described as a highly specialized combination of chemistry and instrumentation. The instrumentation training prepares the students for instrumentation work both in the gas industry and in unrelated industries.

INSTRUMENTATION TECHNOLOGY

THE Northern Alberta Institute of Technology reports that there is a brisk demand for graduates in instrument technology and that this demand is expected to remain strong for at least a decade. In fact, offers of employment outstrip the available supply at this school by two to one.

Instrument technology is primarily concerned with the industrial instruments used in the production of steel, gasoline, and chemicals. These instruments transmit, measure, record, and control temperatures, flows, and pressures and enable the plant operators to better utilize available facilities.

The number of these control systems is increasing at an accelerated rate. Ten years ago, the cost of the control system in a plant was about two per cent of the total cost, while today it has risen to about ten per cent. The employment opportunities for the instrument technician are unlimited. It has been estimated that for every five million dollars of capital investment in industry, one instrument technician is required. This may appear to be rather an insignificant figure, but with the industry planning to spend over $500 million on the development of the Alberta Tar Sands alone, the prospects are more than bright.

Five institutions now offer instrument technology courses. They are the Saint John Institute of Technology, the Institute of Technology at Lauzon, Ryerson Polytechnical Institute, the Northern Alberta Institute of Technology, and the British Columbia Institute of Technology. A 40 per cent increase in graduates in 1966 is expected.

MECHANICAL TECHNOLOGY

PERSONS interested in pursuing a career in mechanical technology can attend any one of approximately a dozen institutes of technology. Graduations in 1966 are expected to be double those of 1965. In addition, both the British Columbia Institute of Technology and the Newfoundland College of Trades and Technology will have their first graduates in the spring of 1966.

Employers report their need for graduates to be greater than the available supply. The scope of mechanical technology is so wide, and its services so basic, that the graduate is in demand in a variety of manufacturing and service industries. Almost all student placement offices report a shortage of mechanical technology graduates. The future outlook for these graduates appears to be bright as rapid advances in automation create new and varied positions. The many supervisory and technical positions in small, single plant industries which will be the result of these advances will mean more attractive opportunities for graduates.

Until very recently the majority of graduates have been employed in the manufacturing industries. Now, however, some service industries, crown corporations, and departments of the federal government are finding the mechanical technology graduate a valuable addition to their technical staff.

Some graduates can expect to find themselves a part of a research team whereby they assist scientists in constructing and operating experimental machines and mechanisms. Others may be part of a design and development team concerned with the application of the ideas of researchers, or with the solution of problems involved in the production of new tools, products, and services, or in making improvements to those already in use. Mechanical technology graduates may make working models, pilot plants, and similar prototypes for test purposes or to determine production methods. Typically, those in research or in design are called mechanical and engineering technicians, engineering assistants, development technologists, or technical assistants.

Many mechanical graduates are involved in materials and process work where their purpose is to ensure effective relations between design and manufacturing or production teams. It was to meet this need for manufacturing personnel that such courses were introduced as industrial management at the Hamil-

ton Institute of Technology, production and materials technology at Northern Alberta, and a production option at Ryerson.

Mechanical graduates are employed in manufacturing firms as production planners, tool designers, estimators, methods men, motion and time-study planners, purchasing agents, and quality controllers or inspectors. Many graduates are selected as foremen or production supervisors within a relatively short time.

MEDICAL LABORATORY TECHNOLOGY

THE field of medical laboratory technology is a rapidly expanding branch of medicine, and developments in this area have created a great need for skilled technology institute graduates.

Working in hospitals or in clinical or medical research laboratories, the medical laboratory technology graduate performs the many scientific tests on which pathologists and other physicians rely for assistance in diagnosing and treating disease.

The basic prerequisite for entrance to a medical laboratory technology course is senior matriculation with credits in mathematics, chemistry, physics, and biology. Percentage averages for admission vary for the different technology institutes.

The College of Trades and Technology, St. John's, has recently instituted a medical laboratory technology course and expects to graduate nine students in 1966. The medical laboratory technology course is also offered at the Nova Scotia Institute of Technology, Manitoba Institute of Technology, and the Northern Alberta Institute of Technology where the total number of graduates in 1965 was approximately 90, with an expected rise of almost 60 per cent forecast for 1966.

Salaries in this field will, of course, vary in different regions as they do in the other technologies.

MEDICAL X-RAY TECHNOLOGY

THE graduate in X-ray technology plays an important role in medical diagnosis and the treatment of disease. Over the past decade there has been a three- to four-fold increase in the number of X-ray examinations undertaken in the hospitals and medical clinics. During this time the sizes of X-ray departments and the numbers of radiological technicians required have increased proportionately.

Senior matriculation with standing in mathematics, English, and science is a prerequisite for entrance to the medical X-ray technology course at both the Manitoba Institute of Technology and the Northern Alberta Institute of Technology.

The Manitoba Institute and Northern Alberta graduated a total of 48 students in this field in 1965 and expect a slight increase in graduations in 1966 to approximately 55.

Northern Alberta also had five graduates in dental lab technology in 1965. There is expected to be 20 in 1966.

Medical X-ray technology is a two-year program for either diagnostic radiography or therapeutic technology. An additional year is required to obtain registration in either specialty. If the student has fulfilled the requirements for examination at the end of the two-year training program, he may write the national examination set by the Canadian Society of Radiological Technicians.

Further academic training, a fellowship in the Society, or a teaching certificate are avenues available to a graduate who is interested in advancement.

METALLURGICAL, MINING, AND EXPLORATION TECHNOLOGY

THE Provincial Institute of Mining of Ontario, Haileybury, reports a very serious shortage of technical personnel in the mining industry at the present time. The institute further states that many jobs remain vacant and that students are often recruited a year before they graduate. The British Columbia Institute of Technology reports that exploration in British Columbia and the Yukon is more active than ever, assuring a constant demand for technicians. The Technological Division of Lakehead University states that the tremendous increase in production in Canadian mines during the past few years has placed a premium on technicians.

Courses in mining technology are offered at the institutes in Burnaby, B.C., Haileybury, Ontario, at the Technological Division of Lakehead University at Port Arthur, and at the Newfoundland College of Trades and Technology. Closely allied to the mining

industry are the metallurgical technology courses given at Three Rivers, Quebec, Ryerson Polytechnical Institute, Toronto, and Burnaby, B.C.

At the Provincial Institute of Mining of Ontario, there is both a two-year program which leads to a certificate of standing, and a three-year course which leads to a diploma in mining technology.

There will be about 40 graduates available in mining technology and more than 75 graduating from metallurgical technology in 1966, almost twice as many as the previous year.

At the Northern Alberta Institute of Technology a materials technology course is offered, with studies involving the testing of metals, plastics, concrete, asphalt, rubber, and the use of x-ray, gamma-ray, magnetic, particle, and ultrasonic equipment. This institute at Edmonton reports that many technicians are and will be employed in this field. As an example, over one thousand miles of pipeline in North America have been tested for soundness using the methods studied in the materials technology course.

The Northern Alberta Institute of Technology also gives a course in exploration technology. This course offers training in geology, geophysics, and electronics. The graduate in exploration technology will use basic scientific principles in the study of the earth's crust and will participate in careful studies and surveys which may take months or years to complete. An important part of the exploration project is the acquisition and evaluation of field data. Graduates are qualified for positions as mine surveyors; draftsmen; gold, silver, and base metal assayers; geological assistants, or mill technicians. There will be about 22 students graduating in this discipline in 1966.

At the Lakehead Institute, mining technology is a terminal two-year course where mine problems in surveying and mapping are stressed and practical work done in both the laboratory and the field. Lakehead reports starting salaries ranging between $375 and $450 per month. There are, however, regional differences in the salaries paid.

SECRETARIAL SCIENCE

Secretarial science is now offered at four institutions—Ryerson Polytechnical Institute, the Manitoba Institute of Technology, the Saskatchewan Technical Institute in Moose Jaw, and the Northern Alberta Institute of Technology. Ryerson's course extends over a three-year period while the others are two-year courses. Over 100 graduates in secretarial science are expected in 1966, more than double the number of 1965 graduates. A large increase in graduations expected at the Manitoba Institute of Technology, plus the fact that the Northern Alberta Institute of Technology will be graduating their first class in 1966, accounts for this growth.

The secretarial science course is designed so that students will achieve competence in shorthand, typing, and office procedures that will enable them, upon graduation, to acquire positions of responsibility. Office, clerical, and secretarial positions make up the largest field of employment for secretarial science graduates. The majority of these positions are to be found in business, industry, government, and the professions. Ryerson reports that some of its graduates are now being employed as commercial teachers in secondary schools.

Entrance requirements usually include graduation from a commercial course in secondary schools.

The only institution reporting salaries, Ryerson, states that the 1965 graduates received approximately $397 per month upon graduation.

TEXTILE TECHNOLOGY

A serious shortage of technically-trained personnel in the textile industry is reported by the Canadian Textiles Institute. As a result of this shortage, the demand for graduates of the textile technology courses at the Hamilton Institute of Technology and the St. Hyacinthe Textile Institute far exceeds the supply.

Cotton and wool and the growing number of man-made fibres, along with automated processing techniques, provide a continuing challenge to the textile technology graduate.

A combined total of 25 students graduated from the textile courses at St. Hyacinthe and Hamilton in 1965. This figure is expected to be almost doubled in 1966.

The Hamilton Institute of Technology is considering the possibility of introducing new options in the near future when the demand and the enrolment are sufficiently high. These will include options in chemical, dyeing, and fibre processing, apart from the present textile technology.

At the St. Hyacinthe Textile Institute, a student may choose either the textile manufacturing course or the chemistry and dyeing course.

NES STUDENT PLACEMENT SERVICE

THE public employment service has been active in the student placement field since 1927 when a student placement office was established at the University of Manitoba by the Manitoba Employment Service.

Today there are 40 full-time NES Student Placement Offices at institutions of higher education. Eleven of these are located at technological institutes. The three additional institutes where only part-time on-campus service is provided are marked with an asterisk.

NEWFOUNDLAND
Newfoundland College of Trades and Technology, St. John's

NEW BRUNSWICK
New Brunswick Institute of Technology, Moncton
*Saint John Institute of Technology, Saint John

QUEBEC
Laval Institute of Technology, Montreal
*Montreal Institute of Technology, Montreal
Quebec Institute of Technology, Quebec City

ONTARIO
Eastern Ontario Institute of Technology, Ottawa
*Lakehead University, Technological Division, Port Arthur
Western Ontario Institute of Technology, Windsor

MANITOBA
Manitoba Institute of Technology, Winnipeg

SASKATCHEWAN
Saskatchewan Technical Institute, Moose Jaw

ALBERTA
Northern Alberta Institute of Technology, Edmonton
Southern Alberta Institute of Technology, Calgary

BRITISH COLUMBIA
British Columbia Institute of Technology, Burnaby

The basic terms of reference used in establishing an NES Student Placement Office on campus involve, first of all, an invitation from the technological institute to the National Employment Service to open discussions. It is then necessary to determine whether or not the institution is large enough to produce the workload which would warrant the provision of the basic staff required on a full-time basis.

The NES requires that the institute assign to it full operational responsibility in providing the placement service. The institution retains the primary responsibility of insuring that an effective placement service is provided for its students. The technological institute, university, or college designates one of its faculty, or an administrative officer, to carry out this function and to act in a liaison capacity between it and the NES Student Placement Office.

The institution provides premises and services such as light, heat, messenger and mail services, notice boards, duplicating facilities, telephones, and so forth. The NES provides staff, furniture and furnishings, office equipment, postage, stationery, and long distance telephone and telex facilities. Personnel in charge of full-time NES Student Placement Offices play an active part in The University Career and Placement Association.

At NES Student Placement Offices, students desiring assistance in finding suitable employment, or who want information on careers, are interviewed and given information concerning different occupational areas and the qualifications required to fill positions in these areas. Students are referred to appropriate employers locally, to those outside of the local area through NES referral facilities, or by arranging interviews with recruiters visiting the institute.

Most of the larger national employers send recruiting teams to technological institutes. The recruiting process is continuous throughout the entire year but visits by employers to institutions of higher education are concentrated during two periods. The first of these covers November and the first half of December while the second covers the second half of January, as well as February and March.

In addition to the placement of graduating students in permanent employment and in advising on career opportunities, the NES

Student Placement Service also provides assistance in finding summer and part-time employment for all students wishing to obtain such work.

Students attending institutes where there is no NES Student Placement Office may obtain employment assistance at local NES offices. Although the service is not as complete as that which would be provided on campus, arrangements are made to meet the special needs of students in finding suitable employment.

UNIVERSITIES AND COLLEGES

The NES Student Placement Service operates twenty-nine full-time offices located at universities and colleges. These are listed, together with five additional institutions which are being provided with a part-time service on campus, and are marked with an asterisk.

Newfoundland
- Memorial University, St. John's

Nova Scotia
- Acadia University, Kentville
- Dalhousie University, Halifax
- *Mount St. Vincent College, Halifax
- Saint Mary's University, Halifax

Prince Edward Island
- *Prince of Wales College, Charlottetown
- St. Dunstan's University, Charlottetown

New Brunswick
- Mount Allison University, Sackville
- Université de Moncton, Moncton

Quebec
- *Ecole des Beaux-Arts, Montreal
- Loyola College, Montreal
- Macdonald College, Ste. Anne de Bellevue
- Sir George Williams University, Montreal
- Université de Montreal, Montreal
- Université Laval, Quebec
- Université de Sherbrooke, Sherbrooke

Ontario
- Lakehead University, Port Arthur
- Laurentian University, Sudbury
- McMaster University, Hamilton
- Saint Patrick's College, Ottawa
- University of Ottawa, Ottawa
- University of Windsor, Windsor
- York University, Toronto

Manitoba
- *Brandon College, Brandon
- United College, Winnipeg
- University of Manitoba, Winnipeg

Saskatchewan
- University of Saskatchewan, Regina
- University of Saskatchewan, Saskatoon

Alberta
- *Mount Royal College, Calgary
- University of Alberta, Edmonton
- University of Alberta, Calgary

British Columbia
- Notre Dame University, Nelson
- Simon Fraser University, Burnaby
- University of Victoria, Victoria

A supply and demand booklet relating to graduating and graduate students of universities and colleges is published annually and is available on request.